HW: Aim 62 Worksheet; Quiz Tuesday, 3/6 on Aims 61 - 66

Aim #62: How do we find the area of a triangle given the lengths of two adjacent sides and the included angle?

Kickoff:

Find the area of triangle ABC. Hint: There is extra information!

\[
A = \frac{1}{2} bh = \frac{1}{2} (22)(6) = 22 \text{ sq. units}
\]
What if we were only given this much information about the triangle?

\[ K = \frac{1}{2}ab \sin C \]

\[ K = \frac{1}{2} \times 22 \times 9 \times \sin 42^\circ \]

\[ K = 66 \text{ sq. units} \]

https://www.youtube.com/watch?v=0bvr4DkKREM

Try: In \( \triangle ABC \), \( b = 10 \), \( c = 8 \) and angle \( A = \frac{\pi}{3} \). Determine the exact value for the area of the triangle.

\[ K = \frac{1}{2}bc \sin A \]

\[ = \frac{1}{2} \times 10 \times 8 \times \sin \frac{\pi}{3} \]

\[ = \frac{1}{2} \times 10 \times 8 \times \frac{\sqrt{3}}{2} \]

\[ = \frac{20\sqrt{3}}{2} = 20\sqrt{3} \]
Try: In $\triangle ABC$, $a = 8$, $b = 12$ and angle $C = 140^\circ$. Determine the area of the triangle to the nearest square unit.

$$K = \frac{1}{2}ab \sin C$$

$$K = \frac{1}{2}(8)(12) \sin 140^\circ$$

$$= 31 \text{ Sq. units}$$

eg. In $\triangle ABC$, $a = 15$ and $b = 60$. Find the measure of angle $C$ to the nearest degree if the area is 240 square units.

$$K = \frac{1}{2}ab \sin C$$

$$240 = \frac{1}{2}(15)(60) \sin C$$

$$240 = \frac{450 \sin C}{480}$$

$$\frac{8}{15} = \sin C$$

$$2 \sin(\frac{8}{15}) = \sqrt{2}$$

$$148^\circ$$
What is the maximum possible area of a triangle that has side lengths of $\sqrt{10}$ and $2\sqrt{5}$?

\[ K = \frac{1}{2} \left( \sqrt{10} \right) \left( 2\sqrt{5} \right) \sin X \]

\[ = \frac{1}{2} \left( \sqrt{10} \right) \left( 2\sqrt{5} \right) \]

\[ = \frac{1}{2} \left( \sqrt{50} \right) \]

\[ = \frac{5\sqrt{2}}{2} \]

The lengths of two sides of a parallelogram are 24 and 36 centimeters. Their included angle measures 50°. Find the area of the parallelogram to the nearest centimeter.

\[ K = ab \sin C \]

\[ = (24)(36) \sin 50 \]

\[ = \]
In triangle ABC, the ratio of side AB to side AC is 1:2 and angle A = 30°. If the area of triangle ABC is 200 square feet, find the length of side AC to the nearest foot.